

A New Wide-Separation Gravitational Lens Candidate: RXJ 0921+4529

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Abstract. The lens candidate RXJ 0921+4529 consists of two $z_s = 1.66$ quasar separated by $6''.93$ with an H band magnitude difference of $\Delta m = 1.39$. The lens appears to be a $z_l = 0.31$ X-ray cluster, including a $m_H=18.5$ late-type galaxy lying between the quasar images. We detect an extended source overlapping the faint quasar but not the bright quasar. If this extended source is the host galaxy of the fainter quasar, then the system is a quasar binary rather than a gravitational lens.

1. Observations

RXJ 0921+4529 was detected as an extended X-ray source in the 160 deg^2 ROSAT survey of Vikhlinin et al. (1998). The X-ray brightness distribution is significantly wider than the local Point Response Function indicating the presence of a moderate redshift cluster of galaxies. R and I band images revealed a significant excess in the surface density of galaxies near the X-ray position and two blue point sources separated by $6''.93$.

MMT spectra of the two point sources identified them both as $z = 1.66$ quasars, making RXJ 0921+4529 a gravitational lens candidate (Muñoz et al. 1999). Cross-correlations of the two spectra give a velocity difference $|\Delta v| \leq 1500 \text{ km s}^{-1}$. Five of the galaxies were found to have redshifts of $z = 0.31$, thus confirming the presence of a cluster. The central lens galaxy G was too faint for us to measure its redshift. We assume it is a member of the cluster.

RXJ 0921+4529 was observed with the Hubble Space Telescope as part of the CASTLES survey. Figure 1 shows the H band NICMOS image, including the A and B quasars and an $H=18.5$ late-type galaxy lying between them. An extended object B' is also detected near the fainter quasar B. Our best models suggest that B' is offset by $\sim 0''.2$ from B. If B' is the host galaxy of B, then the system cannot be a lens because it is not detected in A. Alternatively, B' could be a coincidentally superposed cluster galaxy.

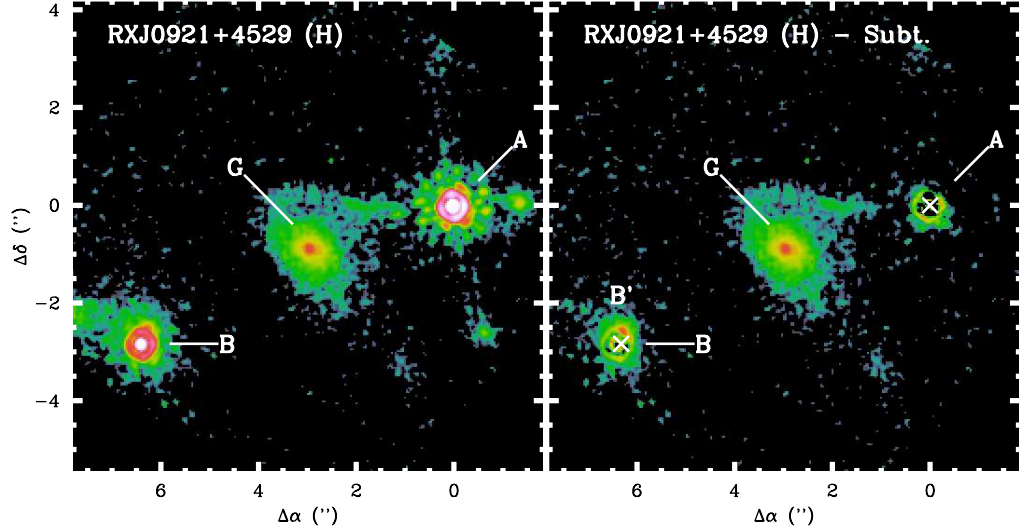


Figure 1. The left panel shows the HST NICMOS H band observed image and the right panel shows the residuals after quasar subtraction.

VLA observations at 3.6 cm detect galaxy G and a nearby cluster galaxy with fluxes $\simeq 1 \pm 0.1$ mJy for both. There may be a very marginal detection of A, at $\simeq 0.1 \pm 0.05$ mJy, so a deeper radio image could clarify the nature of the system.

2. Conclusions

With a separation of $6''.93$, RXJ 0921+4529 would be the widest angular separation quasar or radio gravitational lens. Most of the data support the interpretation of RXJ 0921+4529 as 2 lensed images of a single quasar: the similar spectra of the 2 components, a typical magnitude difference for a lens, a galaxy in the appropriate position to be a lens and a surrounding X-ray cluster to explain the wide separation of the system. Only the extended source B' remains a puzzle. If it is the host galaxy of B, the lack of a corresponding A image of the host would mean it cannot be a lens. The issue could be settled with a deeper HST image.

References

- Muñoz, J.A., et al. 1999, in preparation
Vikhlinin, A. A., et al. 1998, ApJ, 502, 558